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TECHNICIANS FOR THE HEALTH FIELD--A COMMUNITY COLLEGE HEALTH CAREERS STUDY PROGRAM. A FINAL REPORT ON PHASE I OF THE COMMUNITY COLLEGE HEALTH CAREERS PROJECT, OCTOBER 1, 1964 - MARCH 31, 1966.

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THIS REPORT OF THE COMPLETION OF PHASE I OF A FIVE-PHASE PROGRAM CONSISTS OF CURRICULUM GUIDELINES AND RECOMMENDATIONS FOR INSTRUCTOR TRAINING, BASED ON A STATEWIDE SURVEY IN NEW YORK. OBJECTIVES AND REQUIRED KNOWLEDGE, UNDERSTANDING, AND SKILLS ARE DESCRIBED FOR TECHNICAL EDUCATION IN X-RAY, INHALATION THERAPY, DENTAL AUXILIARY, MEDICAL RECORDS, OCCUPATIONAL THERAPY, SURGERY, BIOMEDICAL ENGINEERING, OPHTHALMIC DISPENSING, PUBLIC HEALTH, AND EMERGENCY SERVICES. AN INTRODUCTORY COURSE IN BASIC HEALTH TECHNOLOGY IS DESCRIBED. COURSES BASIC TO ALL FIELDS ARE IDENTIFIED AS ANATOMY AND PHYSIOLOGY, PSYCHOLOGY OR SOCIOLOGY, LANGUAGE ARTS, AND MATHEMATICS. RECOMMENDED PHASES OF TRAINING TEACHERS INCLUDE FAMILIARIZATION WITH JUNIOR COLLEGE, ABILITY TO USE A VARIETY OF INSTRUCTIONAL TECHNIQUES, UPDATING OF KNOWLEDGE IN THEIR TECHNICAL FIELDS, AND BROAD BACKGROUND IN PHYSICAL AND BIOLOGICAL SCIENCES AND HUMANITIES. THEY SHOULD BE ABLE TO ORGANIZE A COMPLETE CURRICULUM IN THEIR FIELDS, USING ALL APPROPRIATE MEDIA AND TOOLS OF INSTRUCTION. (WO)

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TECHNICIANS FOR THE HEALTH FIELD:

A COMMUNITY COLLEGE HEALTH CAREERS STUDY PROGRAM

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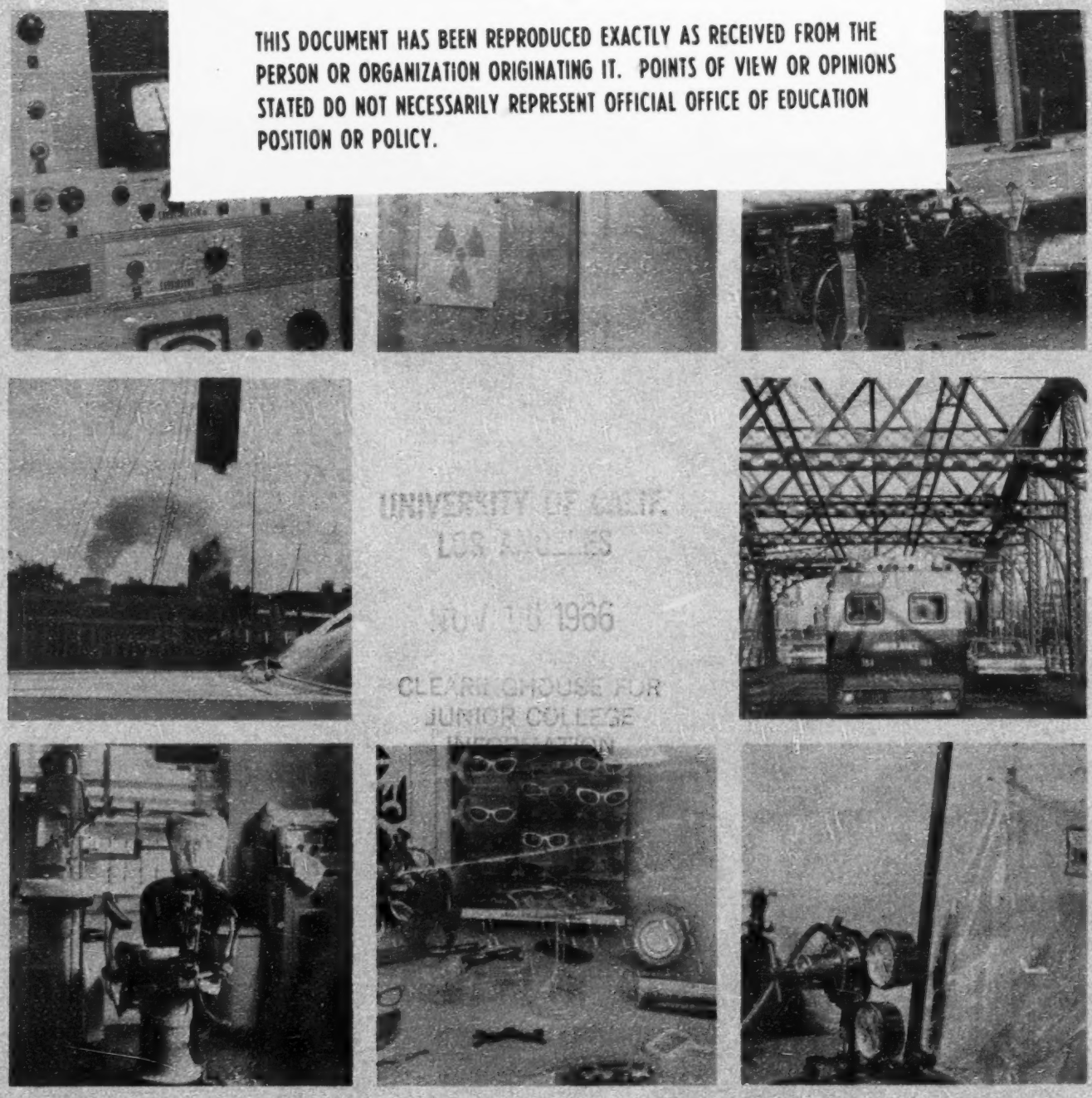

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ABSTRACT

Community College Health Careers Project – a project to develop and strengthen education for health service technicians.

OBJECTIVES:

1. To develop curriculum guidelines for educational programs to be offered by community colleges for the training of health service technicians.
2. To plan and inaugurate new teacher-training programs for instructors and coordinators of community college programs for health service technicians.
3. To establish pilot programs in selected community colleges utilizing the guidelines developed by the project study groups and the instructors prepared by the project teacher-training programs.
4. To assist employers of health service technicians to plan orientation programs for new community college graduates and to develop evaluation instruments for determining the on-the-job effectiveness of new graduates.
5. To undertake a follow-up study of community college graduates on the job.
6. To make recommendations to community colleges concerning curriculum revisions or modifications based upon the results of a follow-up study of graduates.
7. To provide an administrative and curriculum manual for two-year colleges wishing to develop programs for the preparation of health service technicians.

PROCEDURES:

1. Conferences of curriculum and community college consultants, medical and dental practitioners, and health service technicians in allied medical and auxiliary dental areas to plan community college curriculum guidelines.
2. Establishment of educational programs for the preparation of teachers and coordinators.
3. Establishment of pilot programs in selected community colleges for the preparation of health service technicians.
4. Field work with employers on orientation and evaluation of community college graduates.
5. Follow-up study of graduates and feed-back of findings to community colleges.
6. Publication of a guideline manual for community colleges to assist colleges in establishing new programs in health technology.

Technicians for the Health Field:

A COMMUNITY COLLEGE HEALTH CAREERS STUDY PROGRAM

A Final Report on Phase I

of the

Community College Health Careers Project

October 1, 1964 - March 31, 1966

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TECHNICIANS FOR THE HEALTH FIELD:

A Community College

Health Careers Study Program

INTRODUCTION

For the past decade two simultaneous, but independent national developments have followed a course of dramatic acceleration. One of these two developments is a promising educational movement; the growth of the two year community college with its potential role in occupational education. The other development is an increasing demand for health workers on the technical level, and the consequent search for new ways to adequately prepare large numbers of individuals to fill these positions. The Community College Health Careers Project, described in the following report, is designed to support and strengthen these two developments. The project is based on the assumption that the community college has an important role to play in preparing technical level health workers. It is planned to: 1) identify appropriate curriculum patterns for health career programs, 2) prepare community college teachers to carry out the programs thus identified, and 3) establish pilot programs in selected community colleges for purposes of testing the new curriculums and evaluating the graduates by means of on-the-job follow-up studies.

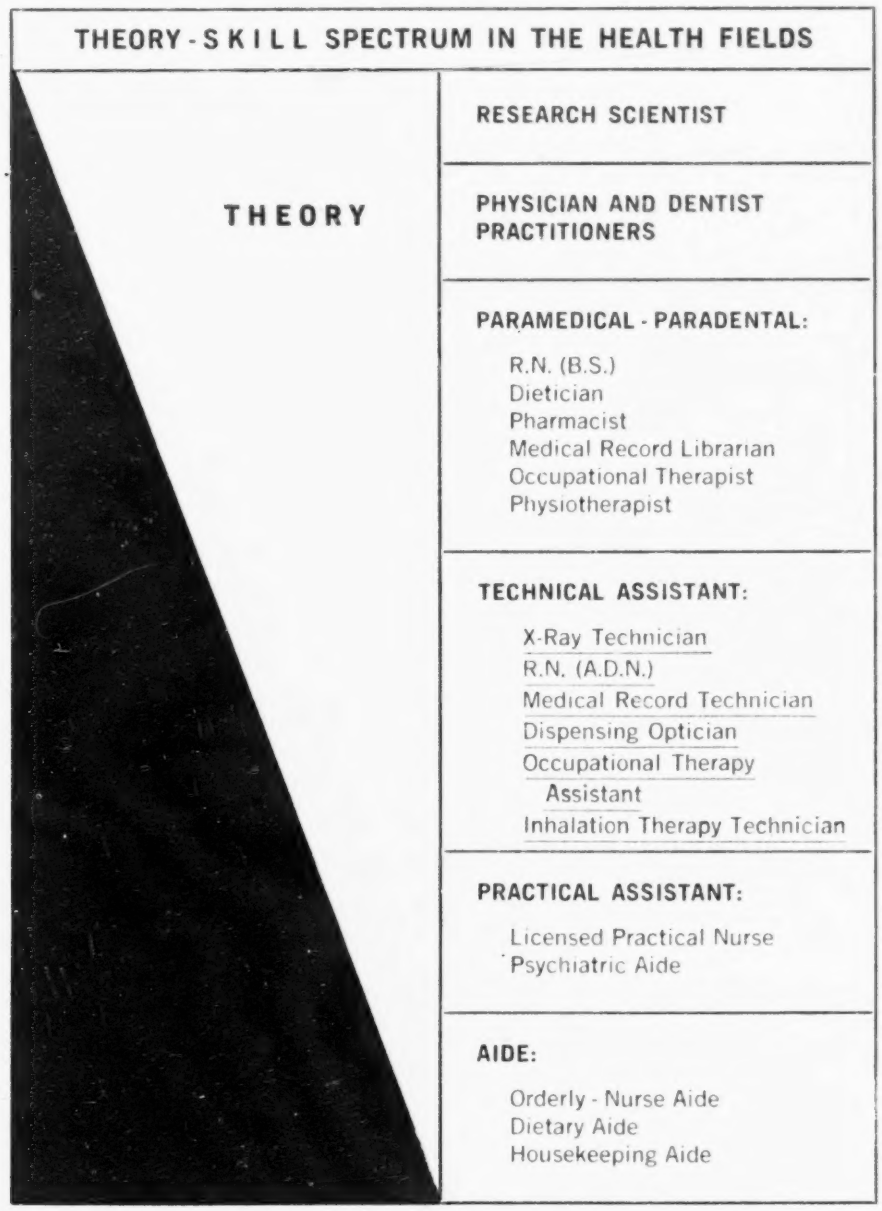
TECHNICIANS IN MEDICINE AND DENTISTRY

During the first phase of the project it was desirable to identify, in broad perspective, the national status of education for health technicians. Under the auspices of the American Association of Junior Colleges, a national survey, Education for Health Technicians - An Overview was completed by the project director. The following discussion of the health technician excerpted from that survey endeavored to identify this worker in relation to others in the health field:

> The lone practitioner of medicine is an anachronism, as is his counterpart in other professions. The knowledge explosion has overwhelmed the professional and escalated his responsibilities. Increasingly he analyzes, plans, and administers services which are provided by others --others to whom he delegates in large measure routines carried out under his direction. The "others" are technicians and assistants. In medicine and dentistry, the list of supporting technicians is long. Some of the names are well known--such as medical laboratory technicians, x-ray technicians, opticians, inhalation therapy technicians, and dental hygienists. Others, many others, are doing the work, but their role

as medical and dental assistants is less well developed. For some we even lack names. They not only assist the physician and the dentist, but, in this expanding field of knowledge and service, there is need for technical assistance for the professional nurse, the physical and occupational therapist, the medical record librarian, the dietitian, and many other.[1]

To help the reader relate the technical level of preparation and service to the broad spectrum of health service personnel (professionals, technicians, and practical aides), the following chart has been prepared. Health service technicians, indicated by underlining examples, are normally prepared for entry into their occupations by pursuing a post-secondary educational program that does not demand the completion of requirements for a four-year baccalaureate degree but usually includes a combination of theory, practical knowledge, manual skill, and, when appropriate, actual clinical practice.[2]



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1. Robert E. Kinsinger, Education for Health Technicians - An Overview (American Association of Junior Colleges: Washington, D.C., 1965), p. 11.

2. Ibid., p. 9.

THE HEALTH SERVICE AGENCY AS AN EXTENDED CAMPUS

A relatively new concept in education for the health field provides the basis for developing community college health technology programs: effective utilization of clinical facilities as an "extended campus". An understanding and acceptance of this new methodology is fundamental to the sound development of college-based technical programs that require extensive clinical practice. As the skills and knowledge required for the beginning technicians' competencies are catalogued, it becomes obvious that much of the student's learning must take place through direct contact with patients. Many new skills must be practiced under educational supervision in the clinical setting. New knowledge becomes meaningful only when applied in a "real" situation. This fact gives rise to the key mechanism by which a college is able to offer effective instruction in the health technologies. It also imposes rigorous demands on the administration and faculty of a college in planning and executing a health technology program.

In most other instances the college has complete jurisdiction over its laboratory facilities and activities. The laboratories are not only owned by the college, but almost all of the variables can be controlled. On the other hand, when the college seeks an extended campus in a hospital or other required health facility it uses those facilities only at the pleasure of the service agency. An added complication stems from the overriding responsibility of the clinical agency to provide safe, effective care to patients. This primary responsibility of the agency may, at times, conflict with the college teacher's efforts to provide appropriate clinical practice for his students. The delicate balance between health professionals and technicians focusing on patient care service and college teacher-technicians wishing to use the same setting for educational experiences is a central concern of many of the community college health technology programs. The close cooperation of the college teacher, who brings his students to the hospital seeking use of an extended campus clinical laboratory, and the health service worker, who must plan his work first to assure patient care and then to acccommodate the teacher and his students, is crucial. That this critical mass can be developed has been proven in pioneering community college programs, particularly in the nursing field. Nevertheless, only careful and continuous joint planning between the college and the health service agency will result in a viable program.

The need for a developmental project to plan and test new ways of using the community college to prepare health service technicians has been combined with the emergence of this fresh approach for providing necessary clinical experiences for students. One result of this combination is the inauguration of the Community College Health Careers Project, a five phase project under the aegis of the Board of Regents of the University of the State of New York and financed during the first phase (October 1, 1964 - March 31, 1966) by the W. K. Kellogg Foundation.

THE PHASES OF THE PROJECT

The five phases of the project are as follows:

Phase I. Conduct a statewide curriculum study which involves medical and dental groups, educators, paramedical practitioners and health service technicians in the development of curriculum guidelines and recommendations for instructor training.

Phase II. Develop programs in at least two teacher training institutions for the preparation of instructors of health service technicians.

Phase III. Develop demonstration centers in selected community colleges designated as pilot programs for new health service technology curriculums.

Phase IV. Assist selected employing agencies to develop orientation and evaluation programs for graduates of the demonstration centers.

Phase V. Conduct a follow-up study of new graduates on the job.

THE PROJECT ORGANIZATION

This report, which will incorporate some data from a Project Interim Report, Community College Health Careers (published to cover the period from October 1, 1964 through September 30, 1965) brings the project narrative to the close of Phase I, Curriculum Study, on March 31, 1966.

The policy making body of the project is designated as a Coordinating Council and consists of six members:

The Associate Commissioner for Higher and Professional Education, State Education Department
The Deputy Commissioner of Health, State Health Department
The Executive Dean for Two Year Colleges, State University of New York
The Chancellor of the City University of New York
The Executive Director, Montefiore Hospital
The Project Director, Chairman

A larger Advisory Committee, serving as a sounding board for the project staff and Coordinating Council, suggested modifications or innovations that might strengthen the project and interpreted the purpose and the program of the project to the public and professional groups. The membership of the Advisory Committee is broadly representative of health professions,

health agencies, educational institutions and others concerned with the education of health service personnel.

Over one hundred physicians, dentists, paramedical personnel and educators served on eleven ad hoc curriculum study groups. The deliberations of these groups are discussed in greater detail in succeeding chapters.

The names of those key individuals who assisted the project during Phase I are listed in Appendix A.

PROJECT FINANCING AND OPERATIONS

The all important "seed money" to underwrite the planning and study activities described in this report was supplied by the W. K. Kellogg Foundation. The importance of the type of subvention that permits a flexible use of funds to support unforeseen developments as they inevitably evolve cannot be overemphasized. The stifling influence of a budget rigidly drawn, when no precedent or even rough guidelines are available, could severely limit such a project. When, in the course of discussions an unforeseen resource or a new study tactic was proposed, both the budget and the administrative structure within the State Education Department permitted quick restructuring and shifts in promising new directions. Important contacts with professional groups, government agencies, and key individuals were never lost because of confining budgetary or administrative ground rules.

While much of the credit for whatever proves worthwhile from this study program is due to the flexible structure within which the program operated, the greatest contribution was probably that of the hundreds of leaders in the health and education fields who devoted so much of their valuable time without recompense. The names in the appendix of study group members, the Advisory Committee, and the Coordinating Council represent only a fraction of those who contributed their time and talent so generously.

PHASE I OF THE PROJECT

During the first eighteen months of the project from October 1964 through March 1966, Phase I of the project, eleven curriculum study groups were formed. Ten of the study groups were concerned with specific health technologies; the eleventh group had a broad concern for the possibilities of developing a foundation or core curriculum common to most health technologies.

Preliminary material gathered by the staff was presented at an initial meeting of the project Advisory Committee to elicit suggestions regarding which areas should be given priority for study. Information gathered by the staff for that meeting included:

1. A summary of current educational activity in New York State in each potential study area (including representative curriculums, source and background of instructors, and descriptions of teaching methods.)

2. Descriptions, when possible, of the usual functions of workers in each potential study area (obtained from interviews and written job descriptions.)

3. A list of professional societies, if any, dealing with each potential study area (including an estimate of influence, standards developed or subscribed to, size of membership, frequency of meetings, and attitude of officers toward community college programs.)

4. A list of key individuals.

5. A comprehensive bibliography.

In addition, the following criteria were suggested for selecting the occupational areas to be studied:

1. Magnitude of need.
2. Potential willingness of employers to hire the graduates.
3. Potential willingness of professionals to cooperate in the conduct of pilot programs.
4. Potential cooperation of the professional society.
5. Salary and working conditions adequate to insure recruitment of students.
6. Reasonable expectation that clinical facilities will be available for training.
7. Tentative length of time required to complete the educational program.

On the basis of the background information gathered, the following occupational entities were recommended for study: Public Health Technician, Biomedical Engineering Technician, Inhalation Therapy Technician, Dental Auxiliary, Occupational Therapy Assistant, Ophthalmic Dispenser (Optician), Surgery Technician, X-ray Technician, Medical Record Technician, and Medical Emergency Technician.

The study groups consisted, in most instances, of three categories of individuals; 1) professional health practitioners (physicians, dentists, occupational therapists, etc.) who utilize the services of technicians in their work; 2) health service technicians who work in the field being considered by the study group; and 3) community college staff members who are responsible for curriculum development and instruction within the framework of the two year college. Modifications of the categories of membership were necessary for study groups focused on emerging fields that do not as yet have a corps of formally

trained workers. An example of such a group is that formed to study a curriculum for biomedical engineering technicians. Biomedical engineers and physicians are required more and more to cope with an increasing flood of instruments to monitor patient function, assist in diagnostic activities, assist in therapeutic management, assist with prognostic activities, and augment body functions during surgery. A technical level person, specifically prepared to maintain, repair, and assist in operating such instruments, is greatly needed. However, lacking technicians to work with the study group, equipment manufacturers familiar with maintenance and repair problems were added to the group.

Each study group centered its activities around a series of key questions:

1. What skills, knowledge, and attitudes must one possess to function successfully in this field?
2. Where and under what conditions can the necessary knowledge and skills be developed; i.e., classroom, laboratory, clinical facility, etc.?
3. What kinds of campus laboratory and extended campus clinical experiences must a college be able to provide for students?
4. What kinds of formal education, work experience, and preparation for teaching will best qualify a coordinator-instructor in this field?

Reports of the proceedings of the study groups were prepared and shared with the group membership prior to each subsequent meeting in anticipation of the eventual development of mutually acceptable statements regarding curriculum, teacher preparation, and guidelines for the selection of laboratory and clinical facilities.

ADVISORY COMMITTEE DISCUSSIONS

The first meeting of the Advisory Committee convened in New York City on February 5, 1965. After an introduction to the purpose, structure, and function of the project proposal, the committee reviewed the framework of limitations, problems, and conflicts within which it would be necessary to work. With this as a background, members reviewed the results of a survey conducted over a four month period prior to the meeting.

The purpose of the survey was to determine the kinds of health service occupations for which technicians are in critical demand. Questionnaires were prepared and sent to a random sampling of twenty general hospitals, with bed capacities of 500 or more, in major metropolitan centers throughout New York State. For each of the occupations, the following information was sought: number of workers needed in the job category; educational requirements of the worker; is worker taught on-the-job - if so what is the length of the program - hours per day and number of weeks; teaching methods, i.e. formal, informal, etc.; source and background of instructors; department responsible for supervision of worker; functions and responsibilities of the worker; and, content of instructional course.

About fifty percent of the questionnaires were returned with roughly seventy percent of requested information provided in each. Composites of the returned questionnaires were prepared for the Advisory Committee review. For the most part, very few formal pre-service training requirements were mandated for workers in those health service fields investigated. Indeed, with the exception of programs in x-ray technology* and ophthalmic dispensing*, there were no pre-service health technology programs offered in New York State in the categories finally selected for the survey.

Based on this review, the Advisory Committee recommended the following:

1. Inaugurate curriculum study sections in each of the proposed health service technologies.
2. Encourage the curriculum study groups to consider the vertical as well as the horizontal implications of the programs. "It would serve a broader educational purpose to educate for continuing professional growth rather than for terminal technical competency."
3. Encourage the study groups to develop educational guidelines based on the technician's occupational needs rather than only on the consumer-agency's task needs.
4. Look into the possibility of establishing a "basic core of study" for all or most of the proposed health service technologies. This would lend itself to more economical use of existing adequately prepared faculty.

The second meeting of the Advisory Committee met in New York City January 10, 1966, to review

1. the findings and conclusions of the ad hoc curriculum study committees. (Summaries of the findings and conclusions appear in subsequent chapters.)
2. proposals for implementing Phase II of the project - teacher training. (See chapter on teacher education.)
3. proposals for conducting concurrent evaluation studies of the project during Phase II of the project.

Highlights of discussions and comments emanating from these reviews, appear in each of the chapters dealing with these areas.

*in the State of New York, practice in these fields is contingent upon licensure

CURRICULUM STUDY CONFERENCES:

X-Ray Technician
Inhalation Therapy Technician
Dental Auxiliary
Medical Record Technician
Occupational Therapy Technician
Surgery Technician
Biomedical Engineering Technician
Ophthalmic Dispenser (Optician)
Public Health Technician: Environmental Health Technician
Medical Emergency Technician
Foundation "Core" Curriculum

The following chapters are summaries of the ad hoc curriculum study committees' activities and discussions during the first phase of the project.

Each study group produced a document with a similar format encompassing an Overview, Objectives, Knowledge and Understanding, and Skills. The "core" curriculum study group developed suggestions for a single introductory course to the field of health technology.

The lists of knowledges, understandings, and skills refer only to the technical portions of the various health technologies. They are not arranged in sequential or hierarchal order. The scope and depth of technical content is not indicated in all areas.

Suggestions for entire health technology curriculum patterns, including general education and basic sciences, are not represented in these guidelines. They are, however, implied in many instances. Individual colleges must build the total curriculum within the framework of the college degree requirements and overall institutional objectives. Not prescribed are courses in general education; i.e., English, social studies, social sciences, etc.

X-RAY TECHNICIAN

Overview

The program is designed to prepare students to become safe beginning practitioners in x-ray technology, who, upon successful completion of such a course, are eligible to enter the State licensing examination. Courses of study are arranged to enable students to gain knowledges and understandings of the diagnostic and therapeutic uses of x-rays, and technical skills to use x-ray equipment in both laboratory and clinical settings.

Objectives

X-ray technology courses are developed to enable students to

1. operate x-ray equipment and to obtain the exact exposure requested by the physician using a minimum of radiation exposure.
2. assist in the treatment of disease when x-rays are used therapeutically.
3. observe proper medical x-ray ethics.
4. understand the nature of x-rays and principles of electricity.
5. know something about the structure of x-ray machines, and the capacities and types of x-ray tubes.
6. be knowledgeable about the operation of a clinical x-ray department.

Knowledge and Understanding of

1. Safety principles in use of x-ray equipment
2. Human anatomy and physiology
3. Basic structure and function of x-ray equipment
4. History and physics of radiation and electricity
5. Mathematics (in order to be able to compute for x-ray exposure)
6. Darkroom chemistry

Skill in

1. maintaining and employing methods of radiation protection
2. performing radiographic techniques: i.e., employ K.V.P., Ma, time, and distance; use and maintain film equipment; adjust control panel and table for exposure; etc.
3. preparing and instructing patients to assume proper positions for x-ray exposure
4. preparing films with proper identifying information after exposure
5. operating darkroom equipment
6. processing film through developer, rinse, fixer, and dryer
7. recognizing improperly exposed film
8. working with ill and handicapped individuals
9. maintaining sterile and isolation techniques
10. preparing patients for special therapeutic and diagnostic procedures
11. observing, recording, and reporting patient conditions
12. maintaining patient and x-ray department records
13. operating mobile x-ray equipment with safety

14. recognizing emergency situations involving patients and acting accordingly
15. assisting radiologists with special procedures; i.e., femoral arteriogram, lumbar aortogram, splenoportogram, carotid arteriogram, etc.
16. assisting in the maintenance of radiology department activities; i.e., scheduling appointments, record filing, maintaining inventories of supplies, etc.

The preparation of technicians in x-ray technology is one of four health service specialties* under study by the Community College Health Careers Project which has been, and is, of concern to the Council on Medical Education and Hospitals of the American Medical Association. The Council, in collaboration with associated professional organizations, has established and published guides for curriculum patterns, criteria, and standards in these health areas which are used by training agencies--notably hospitals--for setting up programs to prepare health service personnel. Through on-site inspection of facilities and examination of the training plan, the Council and/or associated professional organizations review the training agency's compliance with the essentials of the guide before granting its approval. If the program is approved, its graduates are generally eligible to write an examination to become accredited, or registered, or certified, as the case may be.

For each of these health service fields, the guides delineate minimum program lengths. X-ray technology is the only one for which the recommended minimum course of training (twenty-four months) exceeds the average community college program period (eighteen to twenty months). The four hundred prescribed teaching hours, allocated over the twenty-four months are divided into subjects with specific numbers of theory clock hours for each. The remaining hours of the training period are expected to be devoted to skills practice.

Community colleges contemplating the development of x-ray technology programs could not hope to telescope such a program into two academic years. As a consequence, the x-ray curriculum study group evaluated the number of x-ray technology skills and the number of times each should be practiced to enable students in a community college program to achieve the degree of beginning skill and proficiency currently achieved by students in hospital-based x-ray technology programs. The evaluation resulted in the following formulation.

> There are an estimated 100 procedures commonly performed by x-ray technicians in an average service installation. Assuming that it takes about thirty minutes (this is considered average) to perform

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* programs to prepare inhalation therapy technicians, occupational therapy assistants, and medical record technicians are the other three.

each procedure, and that a student gains adequate competency in doing each procedure twenty four times, 1200 hours of practice time would be sufficient: (100 procedures x 30 minutes each x 24 times of practice ÷ 60 minutes = 1200 clinical practice hours.)

No one clinical agency can conceivably schedule that many x-ray procedures for a concentrated period of time -- seven and a half hours for one hundred sixty days. However, facsimile x-ray service installations in the college laboratory would enable students, through repeated practice, to acquire reasonable facility in the use of equipment under varying conditions before encountering a live situation, and without regard for tying-up needed service facilities. Indeed, only after a student has satisfactorily demonstrated, in the college laboratory, his understanding and proficiency in a given procedure or skill would he be permitted to apply it in a "real" situation.

In an effort to ascertain which of the x-ray technician's corps of knowledge and skill could successfully and safely be taught and practiced in the college, and which could only be taught and practiced in the clinical agency, the curriculum study committee reviewed the entire program (as set forth in the above objectives and guidelines.) Their findings revealed that roughly sixty-three percent of the entire curriculum could be centered at the college, while the remaining thirty-seven percent requires the use of clinical facilities.

The curriculum study committee suggested that it would facilitate arrangements of students' college programs to make use of a summer (between the first and second years) as a practicum period. This would afford an opportunity for students to gain concentrated experiences within the clinical setting.

The x-ray curriculum committee discussions were influenced by a recent change in the public health law of the State of New York. As of October, 1965, the law (the first of its kind in the United States) mandates the examination and licensure of operators of x-ray equipment. In addition, it establishes standards of education, training, and experiences in x-ray technology programs: in the main, the standards parallel those of the American Medical Association Council on Education, the American College of Radiologists, and the American Society of X-Ray Technicians.

Since it was anticipated that x-ray technology programs might, someday, be established in colleges, an enabling clause was inserted into the law as follows:

"...has satisfactorily completed a twenty-four months' course of study in x-ray technology in a school of x-ray technology reg-

istered by the department or licensed by the state department of education as maintaining a satisfactory standard. . .or the equivalent of such a course of study in a college as determined by the state department of education. . ."[1]

During the second advisory committee meeting, some concern was expressed that x-ray programs under community college sponsorship in New York State, while they might meet with requirements of the licensing law, might be at variance with the national accrediting standards established by the American College of Radiologists and the American Medical Association Council on Education. X-ray technician graduates from New York State community college programs, although duly licensed by New York State, presumably might not meet requirements for national registry as x-ray technicians.* In large measure, the basis for concern over disparate standards stems from the possibility that it would give rise to the creation of a chaotic multiplicity of "accrediting" bodies. This, in turn, could lead to profusion of "standards" and could, ultimately, dilute the quality of all x-ray technology programs. The validity of this concern has its precedence in other health service fields.

The Advisory Committee agreed to the importance of maintaining open channels of communications with national accrediting agencies throughout all phases of the Community College Health Careers Project.

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1. Laws of New York - Chapter 295, Article 35, Title II, Section 3505, 1 (d).

*A registered x-ray technician is one who has successfully passed an examination given by the American Registry of X-Ray Technicians provided that he has completed a program of study approved by the American College of Radiologists and the American Medical Asssociation Council on Medical Education and Hospitals.

INHALATION THERAPY TECHNICIAN

Overview:

The program in inhalation therapy technology is designed to prepare technicians to work under the supervision of a physician responsible for inhalation therapy departments in health service agencies. Upon successful completion of such a program the student should be eligible for registration as an inhalation therapy technician by the American Registry for Inhalation Therapy which is jointly sponsored by the American College of Chest Physicians, the American Society of Anesthesiologists, and the American Association for Inhalation Therapy. The curriculum is planned to enable students to gain knowledge and skills relating to inhalation therapy technology within laboratory and clinical settings.

Objectives

Courses in inhalation therapy technology are arranged to enable students to gain proficiency and competence to:

1. know how to handle medical gases.
2. use, and maintain all equipment associated with inhalation therapy, and when necessary, troubleshoot malfunctioning equipment.
3. accurately carry out physicians' orders relating to inhalation therapy.
4. assume responsibility for the maintenance of an inhalation therapy department; i.e., maintain equipment and supply inventories, make out and post charge slips, etc.

Knowledge and Understanding of

1. anatomy and physiology
2. chemistry and physics
3. medical terminology
4. the principles by which inhalation therapy equipment operate
5. pathophysiology
6. safety factors associated with the use of medical gases
7. medical gases
8. ethical and legal responsibilities relating to the use of inhalants
9. basic accounting procedures: bookkeeping, recordkeeping, etc.
10. selected pharmacology and chemical therapeutics
11. physical therapeutics
12. mechanics and electricity

Skill in

1. operating, maintaining, and troubleshooting all kinds of inhalation therapy equipment
2. using simple hand tools
3. observing, reporting, recording, and charting
4. maintaining aseptic technique
5. administering patient care following pulmonary procedures

6. administering selected emergency patient-care procedures
7. operating and maintaining cooling equipment
8. teaching self-treatment procedures involving use of inhalation equipment to patients

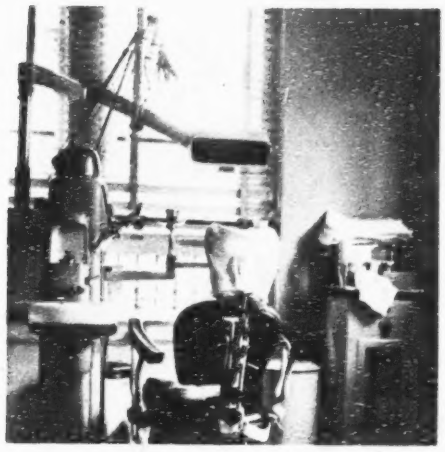
As are other fields, the health service field is experiencing the impact of technological advances which are effecting marked changes and improvements in the quality of medical and health care. But these advances impose a responsibility (and in many instances, a burden) on health service agencies to secure personnel who are appropriately prepared to carry out the new techniques deriving from the new technologies.

Inhalation therapy is an example of one of those medical services which has been revolutionized by the development of new and sophisticated instruments and equipment. With the development of complex equipment and new therapeutic applications of medical gases, there is a concomitant demand for personnel who have not only the skills to operate, maintain, and, if necessary trouble-shoot the equipment, but who also have the basic knowledge to understand the rationale of inhalation therapy.

The increasing number of employment opportunities amply attests to the increasing need for well trained inhalation therapy technicians. The evolving complexity of this technician's task has not, however, been adequately reflected in prevailing salary scales. Needless to say, this is not unusual in times of great change, but if the demand for well-prepared technicians is to be met, remunerative standards, as well as educational and technical standards, will have to be taken into account concurrent with program development.

Members of the curriculum study committee for inhalation therapy technology were concerned with the problem of adequate recompense for technicians, lest the field suffer for want of capable candidates. While there is no mandate for them, the field is particularly attractive to men. Hence, the committee noted, the financial potential should be commensurate with the career potential.

DENTAL AUXILIARY



Overview

The program in dental auxiliary technology is designed to prepare students to become direct assistants to dentists in general and specialized practice. The curriculum is arranged to enable students to gain knowledges, understanding, and skills relating to all aspects of dental auxiliary practice and dental office management within laboratory and clinical settings.

Objectives

Courses are arranged to enable students to gain proficiency and competence in

1. all aspects of office management.
2. chairside assisting.
3. simple oral radiography and prophylaxis.
4. light laboratory work.
5. patient management and some parent teaching.

Knowledge and Understanding of

1. office management activities: simple bookkeeping, filing, typing, systematic patient recall, equipment and supply inventory
2. oral anatomy and physiology
3. psychology
4. interpersonal and group dynamics
5. sterilzation and disinfection
6. dark room chemistry
7. materials and products available and used in dentistry
8. dental instruments and equipment
9. nutrition
10. selected pharmacological, chemical, and physical therapeutics
11. oral pathophysiology
12. radiographic safety factors relating to oral use

Skill in

1. performing dental office procedures: filing, typing, bookkeeping, patient recall, receiving patients and visitors, maintaining appointment calendar, telephone usage
2. observing, reporting, and recording
3. performing simple laboratory skills: preparing and pouring models, investing and casting inlays, making dies for casting, making simple repairs, making simple inlay wax-ups, etc.
4. handling dental instruments and equipment
5. maintaining equipment and supply inventories
6. performing basic prophylaxis procedures
7. seating patients for x-ray filming
8. developing and mounting x-ray film
9. setting up trays for specific dental treatments and procedures

10. preparing dental materials; i.e., amalgem, cement, impression materials, porcelain, etc.
11. sterlizing equipment, instruments, and supplies
12. assisting in emergency first-aid procedures
13. teaching principles of good nutrition
14. instructing patients and their families on the principles of good dental care management

The above guidelines were developed in the hopes that a dental auxiliary could be educated and trained to assist the average practitioner of dentistry as neither the dental hygienist nor the dental assistant appear to be doing presently. In essence, the curriculum study group proposed to prepare a third type of person who comes closest (in the opinion of the study group) to meeting the needs of practicing dentists. This proposal is at variance with the existing official policies of professional dental groups and dental hygienists.

A memorandum describing some of the difficulties encountered by the dental curriculum study group in proposing a "new" dental auxiliary program was prepared for the Advisory Committee. The memorandum also sought the Advisory Committee's thinking on the following questions:

1. In view of the complexities involved, and the strained professional relationships that would develop, should the Community College Health Careers Project, nevertheless, undertake the development of a pilot educational program for a new dental auxiliary: an auxiliary who would, in the opinion of the dental study group, more nearly meet the needs of contemporary dental practice?

2. Should teacher education program for dental assistant instructors be developed under project auspices for the purpose of supplying instructors to existing community college programs?

The second question was posed on the strength of the knowledge that the need for instructors in dental assisting programs apparently has not been met.

The Advisory Committee recommended that the Community College Health Careers Project refrain from the rigors of developing a new and controversial program. Based on this recommendation, the Coordinating Council chose to support efforts to prepare teachers for existing dental assisting programs.

MEDICAL RECORD TECHNICIAN

Overview

The program in medical record technology is designed to prepare technicians as first line assistants to medical record librarians in the medical record department of a hospital, clinic, nursing home, or other health service agency. The medical record technician is responsible for many aspects of preparing, analyzing, and preserving health information needed by health practitioners, by patients, by the hospital, and by the public.

Upon successful completion of such a program, the student should be eligible to write an examination for accreditation by the American Association of Medical Record Librarians.

Objectives

Medical record technology courses are developed to enable students to gain proficiency and competence to

1. review medical records for completeness and accuracy, and to translate diseases and surgical operations into the proper coding symbols.
2. file medical records.
3. type reports of surgical operations, x-ray or laboratory examinations, special treatments given to patients, and case summaries of abstracts.
4. compile statistics of many kinds; e.g., the hospital's daily census; information on reportable diseases for public health authorities, etc.
5. assist the medical staff by preparing special studies and tabulating data from records for research.
6. assist in the supervision of day-to-day operations of a medical record department, supply medical records to courts upon their subpoena and maintain the flow of health information to all departments of the hospital.
7. prepare medical records for microfilming.

Knowledge and Understanding of

1. anatomy and physiology
2. medical terminology and vocabulary
3. basic statistical method and technique
4. medical ethics
5. health service agencies: their organizational patterns and functions
6. legal aspects of medical record-keeping and dissemination of medical information
7. minimum standards of medical record analysis
8. pathophysiology and medical therapeutics
9. techniques of illustrating data; i.e., tables, graphs, etc.

Skill in

1. typing - sixty words per minute with accuracy
2. using transcription equipment
3. coding and indexing medical records
4. making basic arithmetical computations
5. performing a variety of office procedures:
   a. using adding machine, duplicating equipment, collaters, key punch machine, visual aid equipment, microfilm projection equipment, etc.

b. maintaining a basic filing system
6. analyzing medical records
7. assisting professionals with research assignments and tasks relating to medical records
8. developing and maintaining good interpersonal and interdepartmental relationships

As noted in an earlier report, the Education and Registration Committee of the American Association of Medical Record Librarians has, for years been encouraging the development of community-junior college programs for the education and training of medical record technicians.

The above objectives and curriculum guidelines closely parallel those prepared by the above-named association in collaboration with the Council on Medical Education of the American Medical Association, and appear in a School Administration Handbook obtainable through the Chief of Educational Programs of the A.A.M.R.L.

OCCUPATIONAL THERAPY ASSISTANT

Overview

The program for occupational therapy assistants is designed to prepare students to assist professional occupational therapists in health service agencies. Upon successful completion of a program endorsed by the American Occupational Therapy Association the student should be eligible for certification as an occupational therapy assistant by that organization. The program is designed to enable students to gain knowledge and skill relating to occupational therapy in classroom, laboratory and clinical settings.

Objectives

Programs for occupational therapy assistants are planned to enable students to gain proficiency and competence to assist the professional occupational therapist to implement

1. general activity programs - to provide the patient with a continuing opportunity for self-expression and enrichment, acceptance and recognition.
2. supportive or long-term care programs - to achieve and/or maintain the highest level of physical, emotional, social and vocational function of the patient.
3. specific therapeutic techniques - to correct or modify the limitations of pathological conditions.

Knowledge and Understanding of

1. the roles and functions of the professional therapist and the assistant and their relationships to other members of the health team
2. ethical and legal responsibilities of persons working in the health fields
3. normal human growth and development

4. elements of the dynamics of abnormal behavior
5. body structure and mechanics
6. common clinical conditions to enable the student to understand disease and injury and the limitations they impose on human activity
7. kinds of material and equipment which can be adapted to the functional needs of patients
8. groups recreational and social techniques, and group dynamics
9. basic learning processes under normal and modifying conditions such as age, physical or emotional disability, physical handicaps, etc.
10. simple medical and professional vocabulary, methods of observation, reporting and recording
11. utilization of clinical and community resources

Skill in

1. working effectively with people of all ages who, because of their physical or emotional conditions, can benefit from occupational therapy
2. working with a variety of craft media and techniques; i.e., woodworking, weaving, ceramics, etc.; use and care of tools
3. adapting tools and equipment for handicapped individuals
4. observing reporting and recording
5. assisting patients with activities of daily living, including self care

The American Occupational Therapy Association has long been aware of, and concerned with, the need to prepare personnel to assist professional occupational therapists. Representatives of this association have indicated their interest and willingness to cooperate with the Community College Health Careers Project in establishing curriculum guidelines and objectives for a community college program in occupational therapy assisting. Indeed, the above details have been prepared with the cooperation of members of the education committee of the American Occupational Therapy Association.

SURGERY TECHNICIAN

Overview

The program in operating room technology is designed to prepare students to become safe beginning practitioners as surgery technicians who, under the direct supervision of professional nurses and surgeons, can function as "scrub" and "circulating" assistants during surgical procedures in selected health service agencies. Courses of study are arranged to enable students to gain knowledge and skill within laboratory and clinical settings.

Objectives

Operating room technology courses are organized to enable students to gain proficiency and competence to function as a

1. "scrub" assistant who is responsible for
   a. preparing the operating room for surgery.
   b. passing instruments and equipment to surgeons during surgery.
   c. caring for the operating room and equipment following surgery.
   d. observing, reporting, and recording selected data associated with surgery.
2. "circulating" assistant who is responsible for
   a. assisting with patient-care measures preceding and immediately following surgery.
   b. securing supplies and equipment for the surgeons and surgery technicians as required during surgery.
   c. assisting the anesthesiologist during surgery.
   d. observing reporting, and recording selected data associated with surgery.
3. unit management assistant who is responsible for assisting professional staff in
   a. supervising non-technical personnel in the surgery department.
   b. maintaining schedules for the use of surgery facilities.
   c. maintaining equipment and supply inventories, etc.

Knowledge and Understanding of

1. anatomy and physiology
2. microbiology
3. psychology
4. medical emergency care procedures
5. good body mechanics
6. good communications
7. sterilization and disinfection
8. legal and ethical principles of medical and surgical practice
9. medical and surgical asepsis
10. pathophysiology
11. preparation of surgical supplies
12. basic arithmetic
13. medical terminology and vocabulary
14. unit and personnel management
15. good interpersonal relationships
16. interdepartmental organizations of selected health service agencies

Skill in

1. maintaining, caring for, testing, and manipulating surgical instruments, equipment, and supplies
2. maintaining aseptic technique
3. performing selected patient-care procedures; i.e., bladder catheterization; temperature, pulse, respiration, and blood pressure determinations; preoperative skin preparation; patient positioning, moving, and lifting; etc.
4. assisting with the application of postoperative dressings
5. transporting patients
6. operating sterilization equipment
7. handling selected medications and solutions
8. maintaining an optimum environment

9. assisting in the administration of medical emergency procedures under modifying conditions
10. assisting with scheduling the use of surgery facilities
11. assisting with supervision of non-professional and non-technical personnel

The use of the term "surgery technician" has been proposed and adopted by the study committee to designate the graduate of a community-college based program in operating room technology. The action was taken because the term "operating room technician" can mean anyone from a highly trained individual, to an aide with very little training.

The training of operating room technicians is undertaken in a variety of settings, and for varied lengths of time. Some training programs are as long as fifty-two weeks, while others may be as short as five or six weeks. Compounding this disparity, is the wide range of training program activities. Some "O.R. technicians" are trained to become scrub assistants for all kinds of surgery, while others are prepared to assist only in "minor" surgery. There is generally no prescribed curriculum for most of these programs, and in many instances, "training" is provided informally as time and operating room schedules permit.

On the other hand, the kind of formal pre-service program envisioned by the Community College Health Careers Project, is designed not only to "train" technicians, but to "educate" them as well. The proposed curriculum is comprehensive and is planned to provide opportunity for students to gain knowledges and understandings underlying modern operating room techniques and practices as well as skills.

A second factor, perhaps more compelling than the first, stems from the changes being made in nursing education curricula. Operating room practice and experience is gradually being eliminated from many nursing programs. As a consequence, fewer and fewer nurses will be attracted to the service. Normal attrition rates will result in further reductions in the professional nursing staff in operating rooms. While professional nurses will continue to be responsible for the clinical aspects of patient management in operating rooms, the day is not too distant when most operating rooms will be staffed almost exclusively with technicians. Such activities as scheduling the use of operating room facilities; preparation and care of facilities, equipment, and supplies; and supervision of nonprofessional non-technical personnel will, more than likely, be transferred to a highly specialized individual - such as proposed in this project.

Hence, the new term - "surgery technician."

The broadened occupational scope for the surgery technician calls for a broadened educational program. Therefore, some introductory principles of unit and personnel management have been added to the curriculum.

The Advisory Committee, upon reviewing it, subscribed to the proposal as set forth by the study committee. They did, however, express one reservation. The Committee thought there would be areas of resistance to recognizing and accepting a surgery technician so broadly conceived. It was suggested, therefore, that a concurrent effort be made to familiarize physicians, surgeons, and hospital staffs on the excellence of the educational program designed to prepare quality surgery technicians.

BIOMEDICAL ENGINEERING TECHNICIAN

Overview

The program in biomedical engineering technology is designed to prepare graduates of engineering programs (A.A.S. or higher) as biomedical engineering technicians to function as first line assistants to professional engineers, physicians, and surgeons in health service and medical research agencies. The biomedical engineering technician is responsible for operating, maintaining, troubleshooting, and repairing mechanical, electrical, and electronic equipment and instruments which have been and are being designed for use in medical practice. Courses of study are arranged to enable students to gain knowledges, understandings, and skills relating to biomedical engineering technology within laboratory and clinical settings.

Objectives

The curriculum is organized to enable students to gain proficiency and competence in instrumentation procedures designed to

1. monitor patient functions; i.e., cardiac function, nerve function, etc.
2. assist in diagnostic activities; i.e., electrocardiography, electroencephalography, radiography, etc.
3. assist in therapeutic activities relating to patients' organic functions; i.e., cardiac defibrillators, pace-makers, etc.
4. augment body functions during surgery; i.e., heart-lung by-pass, etc.
5. support life in acute or chronic systemic failure; i.e., pulmonary resuscitation, kidney dialysis, etc.

Knowledge and Understanding of

1. basic principles of
   a. physics (classical and nuclear)
   b. chemistry and laboratory arts
   c. electronics, solid state electronics
   d. mechanics
   e. mathematics (up to and including operational calculus)
2. human anatomy and physiology
3. biochemistry and physical chemistry

4. mechanical and physiological aspects of biological phenomena
5. computerization
6. medical and engineering vocabulary and terminology
7. interdepartmental relationships in health service agencies
8. interpersonal and group dynamics
9. electrical and chemical phenomena of the body
10. instrumentation systems
11. graphics

Skill in

1. operating, maintaining, troubleshooting and repairing machinery and instruments related to biomedical engineering activities
2. maintaining optimum safety conditions associated with the use of equipment and gases
3. working within and maintaining as aseptic environment
4. performing analyses of gases used in health service milieus
5. using tools, such as found in basic repair kits, with dexterity
6. operating simple machine tools; i.e., lathe, drill press, grinder, etc.

Members of the curriculum study committee regard the field of biomedical engineering as, fundamentally, an engineering field. The above objectives and guidelines are a composite of the total educational base considered minimally appropriate for the beginning biomedical engineering technician. Evident, though not spelled out in the guidelines, is the richness and comprehensiveness of the engineering content a prospective technician requires as a background. Based on this, therefore, the study group strongly recommended that individuals undertake the study of biomedical applications of electrical, mechanical, chemical, and electronic engineering principles only after having completed at least a basic engineering technology program.

Seemingly, the proposal implies a three year sequence, but this is not the case. On the contrary, the study committee envisioned a one year program - a topping program, or year of practicum - which could be offered in a variety of educational settings.

Such a program could be offered in a community college or a technical institute, or even in a four year college. Because of the nature of biomedical engineering technology, it was considered advisable that the institution conducting such a program have reasonably well-equipped engineering laboratory facilities.

The study committee's recommendation was put before the Advisory Committee which, upon evaluating the proposal, concurred with the study group.

In addition to those already suggested by the study group, the Advisory Committee pointed out the merits of two other kinds of educational institutions where a biomedical engineering technology program could suitably be based. One of these is a university center for health related professions. A salient feature of such a center is its campus hospital. Since biomedical

technology relies heavily upon practicing skills within a clinical setting, it was thought that the university center would be a natural kind of agency to sponsor the program.

The second idea offered by the Advisory Committee was that, because biomedical technology builds upon a basic engineering technology (offered in many community colleges,) the upper division college (junior and senior years) would be a likely kind of educational institution in which to locate the program.

The final decision on where to locate the pilot program will depend upon further study of the significant variables, (of which there are many,) affecting the selection.

There are some who do not agree with that part of the overview statement which limits study in this field to graduates of engineering technology programs. The basis for disagreement stems from the scope of responsibility and function assigned to the biomedical engineering technician; i.e., "The biomedical engineering technician is responsible for operating, maintaining, troubleshooting, and repairing mechanical, electrical, and electronic equipment. . ." It was pointed out that if this is to be considered an accurate statement of the program's objective, eligibility of students should not be predicated on the requirement that they first be qualified engineering technicians. Proponents of this view think that operational calculus, graphics, fabrication, and design could safely be deleted from the proposed curriculum. In short, it is the opinion of some educators that a basic two year curriculum could be designed to prepare the kind of technician envisioned in the overview statement. Several representatives from firms manufacturing biomedical instruments and equipment concur in this opinion.

During the period of teacher-training details of the specific curriculum will be the concern of teacher-trainees in the biomedical field. These trainees will utilize guidelines and advice provided by the curriculum groups as they undertake their studies.

OPHTHALMIC DISPENSER (OPTICIAN)

Overview

The program is designed to prepare students to become safe beginning practitioners in ophthalmic dispensing, who, upon successful completion of such a course, are eligible to enter the State licensing examination. Courses of study are arranged to enable students to gain knowledges, understandings, and skills in all aspects of opticianry within laboratory and clinical setting.

Objectives

Ophthalmic dispensing courses are organized to enable students to gain proficiency and competence to

1. fill accurately prescriptions for corrective lenses.
2. recognize visual and ophthalmic conditions requiring the attention of the optometrist or the ophthalmologist.
3. become oriented to business practices relating to ophthalmic dispensing.

Knowledge and Understanding of

1. vocabulary and terminology of related visual disciplines; i.e., ophthalmology, optometry, and physiological optics
2. materials and products available and used in ophthalmic dispensing
3. manufacturing processes related to the use of these materials
4. the significance of eye and visual anomalies; i.e., cataract, glaucoma, etc.
5. ophthalmic instruments
6. ethical and legal responsibilities among professional and non-professional personnel
7. business practices
8. interpersonal relations and group dynamics
9. mathematics; i.e., arithmetic, algebra, geometry, and trigonometry
10. geometri optics
11. basic physics and scientific procedure

Skill in

1. interpreting written communications
2. observing, reporting, and recording
3. surfacing (lenses)
4. performing bench work activities
5. analyzing prescriptions and spectacle design
6. evaluating spectacles
7. fitting and adjusting spectacles
8. developing and making special spectacle frames
9. counseling customers
10. using measuring instruments and devices
11. setting up promotional displays
12. maintaining and repairing optical machinery and instruments
13. fitting low-vision aids and devices
14. fabricating and fitting ophthalmic prostheses
15. fitting ancillary ophthalmic appliances; i.e., spectacle-hearing aids, etc.

16. fabricating, adjusting, and fitting prescription contact lenses; i.e., corneal, scleral, cosmetic, etc.
17. preparing cost and statement analyses
18. counseling on spectacle fashion and design

Ophthalmic dispensing is one of the health service fields for which a two-year pre-service program has already been developed.* Because the technical aspects of the curriculum are so comprehensive and dependent upon early skills development, it was thought that the program would not be readily adaptable to the proposed core curriculum pattern. However, members of the study committee believe that some elements of the basic health technology course should be incorporated into the existing ophthalmic dispensing curriculum pattern.

Ophthalmic dispensing was included as part of the Community College Health Careers Project, not to demonstrate that it can be successfully taught within a pre-service educational setting (this has been done: Erie County Technical Institute has offered its program for the past fifteen years) but to encourage the development of many more such programs.

PUBLIC HEALTH TECHNICIAN
(Environmental Health Technician)

Overview

The program in environmental health technology is designed to prepare technicians qualified to assist sanitary engineers, scientists, physicians and veterinarians in public health services to gather data on, inspect, and evaluate facilities and industries concerned with commodities and services consumed by the public. The curriculum is arranged to enable students to gain knowledges, understandings and skills relating to environmental health through experiences in the laboratory and in the field.

Objectives

Courses have been developed to enable students to gain proficiency and competence to assist professional personnel in all aspects of surveillance over

1. water supply.
2. the food industry; i.e., processing, distribution, and service.
3. sewage disposal facilities and plants.

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*There are three such programs in the United States: Ferris State College, Big Rapids, Michigan; Erie County Technical Community College, Buffalo, New York; Los Angeles City College, Los Angeles, California.

4. building construction and maintenance (including health aspects of housing).
5. air pollution.
6. recreational establishments including swimming pools.

Knowledge and Understanding of

1. chemistry
2. physics
3. mathematics
4. bacteriology
5. surveying methods
6. sanitary control methods relating to food, water, air, and sewage treatment and disposal
7. epidemiology and communicable disease control
8. health service agencies: their organizational patterns, activities, function, and interdepartmental relationships
9. building construction, materials, legal codes, etc.
10. instrumentation relating to data-gathering, detection, etc.
11. interpersonal relations and group dynamics
12. ethical and legal responsibilities relating to public health
13. good communications
14 sterilization and disinfection

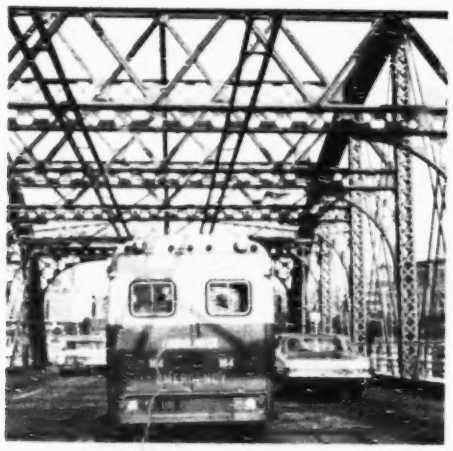
Skill in

1. observing, reporting, and recording
2. using instruments and equipment relating to data gathering, detection, etc.; i.e., microscopes, surveying equipment, measuring devices, etc.
3. sterilization and disinfection techniques
4. selected chemical and bacterial analyses
5. preparing and preserving cultures taken from food, water, milk, air, etc.
6. maintaining electronic equipment, and simple troubleshooting of same, if necessary

Recent and forthcoming federal and state legislative acts, designed to control and remedy conditions contributing to air and water pollution, has created a groundswell of interest in the field of environmental health. Public and private programs, organized to administer control measures, will require increasing numbers of professional and technical personnel to implement them. The above objectives and guidelines represent the framework for a program to broadly prepare technical assistants for environmental health actitivites.

Although public health technology also concerns itself with maintaining public safety wherever and whenever ionizing radiation equipment and supplies are used, (radiological health technology) members of the curriculum study and advisory committees recommended that the Community College Health Careers Project confine its activities to developing programs only in the more general area of environmental health. The impetus for this recommendation derived from knowledge that the United States Public Health Service is sponsoring a number of pilot programs in radiological health technology.

MEDICAL EMERGENCY TECHNICIAN



Overview

The program in medical emergency technology is designed to prepare technicians to become members of the health team and who are qualified to; a) respond to medical emergency calls; b) evaluate the nature of the emergencies; c) take appropriate prompt action to reduce the medical hazards to patients; and d) accompany the patients to the receiving station, e) serve as technical assistant to the emergency room staff of general hospitals. The curriculum is planned to enable students to gain knowledge and skill relating to medica emergency technology within laboratory and clinical settings.

Objectives

Courses in medical emergency technology are arranged to enable students to gain proficiency and competence to

1. make accurate observations of patients' conditions upon arrival at the emergency scene and during the transit phase until they can be seen by physicians.
2. continue to function with the medical team in the receiving center if needed.
3. assist emergency rescue personnel with rescue procedures.

Knowledge and Understanding of

1. inter- and intra-departmental organizations of health service agencies
2. structure and function of public health agencies; i.e., federal, state, county, municipal, and private
3. the role of police, fire-fighting agencies, volunteer, and proprietary ambulance services in emergency and rescue operations
4. interpersonal relationships among personnel of all types of public health and public safety agencies
5. ethical and legal responsibilities relating to medical emergency management
6. communications systems as used in emergency and rescue work
7. the uses and functions of a variety of rescue vehicles and equipment
8. medical vocabulary and terminology
9. anatomy and physiology
10. pathophysiology
11. selected pharmacological, chemical, and physical therapeutics
12. medical emergency first aid procedures

Skill in

1. observing (look, listen, smell,) reporting, and recording
2. performing selected patient-care procedures

3. performing first-aid procedures to restore breathing and circulation (external cardiac compression) control hemorrhage, immobilize limbs, and minimize hazards of fire, shock, ingestion of poison, etc.
4. using communications systems associated with emergency and rescue operations
5. operating and manipulating emergency and rescue vehicles and equipment
6. assisting other medical personnel as required

The knowledges, understandings, and skills, outlined above, are not unique in either health services or emergency rescue services. However, the proposal for a community college program designed to prepare a technician with competencies in both kinds of services is unprecedented.

Notwithstanding the public's desperate need for comprehensively trained medical emergency rescue personnel, the extremely limited employment opportunity for such technicians is discouraging. A whole series of changes in ambulance services, salary scales, rules and regulations, and possibly laws, would be required to assure employment for any large number of graduates.

The difficulties and impracticalities associated with developing educational programs in service areas for which jobs do not exist was recognized even as the Community College Health Careers Project began. Despite this, the distressing lack of adequately prepared medical emergency personnel suggested that high priority should be granted to forming a group to study curriculum needs for this field.

The study was undertaken to see if a two-year college program could be the primary framework within which to work.

In the event that the objective to develop a two-year community college program in medical emergency technology could not be met, and in order to take advantage of the study committee's time and effort in identifying appropriate curriculum objectives and course content, two alternative recourses were kept in reserve. It would be possible to

a. change the focus of the original pursuit to one of preparing a limited number of medical emergency technicians who could assume responsibilities as in-service trainers for agencies providing ambulance rescue services; or

b. develop materials for short-term non-credit programs to be offered in a community college evening-extension division. Prospective students for this kind of program, presumably, would already be employed as ambulance attendants, and the like.

A memorandum, which both described the results of the curriculum study committee, and restated the problem of limited employment opportunity,

was prepared for discussion at the second Advisory Committee meeting. The consensus of that group was that the great need for well trained medical emergency and rescue personnel transcends all other problems attendant to the project's proposal. The Advisory Committee, consequently, recommended that the project should expend its efforts in the direction of developing a full two-year community college program. Concurrent with this effort, discussions and meetings should be initiated and scheduled with potential employers of medical emergency technicians to a) acquaint them with the program - its philosophy, objectives, etc.; and b) in the interest of providing improved emergency services, secure their cooperation and willingness to provide employment opportunity commensurate with such a technician's education, training, and background.

The Coordinating Council's decision to support the above recommended action is predicated on the expectation that as the work of graduates from medical emergency technology programs becomes known, and as their value is demonstrated, the demand for more of them will be forthcoming.

Shortly after the Community College Health Careers Project was launched, the Dutchess Community College entered into negotiations with the Dutchess County Ambulance Association to organize an extension program in ambulance rescue techniques under the college's auspices.

Dutchess County's ambulance rescue services are, for the most part, supplied by several corps of volunteers. Some time ago, in the interest of providing improved services, the various volunteer corps met and formed their present association. The association sees, as one of its functions, the need to encourage its members to maintain a high level of competency through refresher courses.

During a planning period of almost a year, the Dutchess Community College, the Dutchess County Ambulance Association, and the Dutchess County Medical Society, with some consultation assistance of the Community College Health Careers Project staff, developed a thirty-three hour program. The program was divided into eleven sessions of three hours each. The purpose of the course was to establish uniform standards of training for all volunteer ambulance units in the county.

The course was open to members of the ambulance association who held active advanced first aid certificates. Students in the program represented as many as eighteen ambulance rescue squads. As each class session was concluded, the students were asked to evaluate the usefulness of activities and class experiences. The students were particularly interested in classes dealing with legal aspects of medical emergency rescue work, rescue techniques during fire emergencies, pediatric and obstetrical emergencies, and poison control and treatment.

The college is planning to offer the program again during its Spring 1966 term.

BASIC HEALTH TECHNOLOGY

Overview

The course in basic health technology is designed to introduce students to a broad spectrum of career opportunities and to assist the students to select a specific career for which they have demonstrated interest, ability, personality, and character. Content has been selected to provide students with a foundation of knowledges, understandings, and skills common to a variety of health service technologies to serve as a base from which special technologies may depart.

Objectives

Course content has been developed to enable students to

1. become oriented to and gain general understandings of health service resources.
2. gain understanding of, and experience with, team relationships.
3. become acquainted with health field ethics.
4. gain knowledge and understanding of pathophysiology and pathopsychology.
5. understand how diseases are treated.
6. develop skills in maintaining environments conducive to patient welfare.

Knowledge and Understanding of

1. health service resources -- their interrelationships, functions, activities, etc.
2. interpersonal and group dynamics
3. medical team relationships
4. medical terminology and vocabulary
5. legal and ethical responsibilities relating to health services
6. pathophysiology and pathopsychology
7. diagnostic techniques relating to health care
8. therapeutic techniques relating to health care
9. record-keeping relating to health services
10. principles of asepsis, sterilization, disinfection, and antisepsis
11. selected emergency first-aid procedures

Skill in

1. observing, reporting, and recording
2. determining temperature, pulse, respiration, and blood pressure
3. moving and transporting patients
4. working with patients who are receiving special treatments; i.e., nasogastric intubation, inhalation therapy, urinary bladder intubation, intravenous infusion, etc.
5. working with patients who are unconscious, hyperactive, hypoactive, in shock, in pain, bleeding, moribund, etc.
6. effectively communicating and working with patients who are normal, young, aged, physically or emotionally handicapped, etc.
7. achieving and maintaining aseptic conditions
8. maintaining isolation techniques
9. achieving optimum environmental conditions conducive to patient welfare; i.e., lighting, ventilation, acoustics, etc.
10. working with members of the medical team
11. performing selected emergency first-aid procedures

The formation of a study committee to look into the possibility of establishing a "basic core of study", for all or most of the proposed health service technologies grew out of a recommendation of the Advisory Committee, which was adopted as a course of action by the Coordinating Council.

After the individual curriculum study committees had had at least one meeting to identify the educational objectives and major curriculum content in each of the health service specialties, the "core curriculum" committee held its first meeting.

The committee reviewed the activities and recommendations of the ten study groups. In each case, the specialty groups had arrived at specific curriculum content for their fields of interest, which was founded upon basic concepts derived from a number of disciplines. These were: the sciences -- natural, physical, and social; mathematics; and language arts. In addition to these, a number of knowledges, understandings, and skills relating to a variety of health services were mentioned in many of the specialty groups. These were organized into one course - a basic health technology course - objectives and guidelines of which appear above.

In addition to organizing a basic health technology course, the core curriculum committee outlined a comprehensive core program - patterned for the first college semester. Courses in this pattern are as follows:

A. Human Anatomy and Physiology -- a general education course, which should serve as a framework for building medical vocabulary in addition to providing the base upon which specific health technology specialties will build.

B. Psychology or Sociology -- selection will probably depend upon individual college schedules. Most colleges offer one or the other, but health technology students will eventually study both subjects sometime during their two years of work. This, too, will be a general education offering.

C. Language Arts -- selections of courses from this discipline should concentrate on strengthening students' reading comprehension, writing, and verbal skills.

D. Mathematics or elective selection from general education -- after considerable thought, the core curriculum committee recommended that mathematics, per se, not be mandated, since it will not be known how much or what kinds of mathematics courses students will require. (Much of this will depend upon students' experiences in secondary schools, and upon their tested needs.) Consequently, the committee recommended that the pattern in this area be left flexible.

E. Basic Health Technology -- a technical course, content of which cross-

cuts the major health technology specialties. (See Overview and Objectives above.)

The committee anticipated some problems in the above approach. The first of these deals with the fact that there are some on-going health technology programs in community colleges (e.g., nursing, ophthalmic dispensing, x-ray technology) each with differing curriculum patterns, which are governed by state licensure requirements. It was pointed out that it would be somewhat difficult to coincide their established first semester offerings with those of the suggested health technology foundation semester. While it is understandable that the nature of some health service technologies will militate against conforming to a curricular mold, the major problem concerns the "uncommitted" health technology student. If, during the second semester, a student who had not chosen a health service specialty, selects one of the above-mentioned programs, he will be at a disadvantage for having missed technical subject matter. (The second, third, and fourth semesters in these programs build upon competencies and knowledges gained in the first semester.) One suggested solution is that such students be given time to, somehow, make up their technical deficiencies in order to enter the technology of their choice.

A second anticipated problem is, in a sense, converse to the first. There are many students who have already made up their minds to be nurses, or ophthalmic dispensers, etc. The question raised was, "should such a student be required to undertake the study of basic health technology?" The general thought of the committee on this issue, was that the college offer a "double track" system. One would serve the needs of students who do not know which health technology will suit them. The second track (the already established programs) would accommodate students who will have selected their careers before entering college.

Practically speaking, there will probably be other problems attendant to the "foundations semester" proposal. In the opinion of the core curriculum committee, however, such problems will undoubtedly arise under the modifying conditions of individual college set-ups, and should be dealt with as needed.

By and large, members of the core curriculum committee and the Advisory Committee concurred in the opinion that a foundations semester with a basic health technology course is needed, and should prove helpful in attracting more students into the health service field.

PLANS FOR TEACHER EDUCATION

The study groups were generally agreed that planning for curriculum financing, student recruitment, laboratory facilities, arrangements for clinical practice, and textbooks is a hollow exercise unless a trained corps of instructors is available. Therefore, the first action phase of the project necessarily must involve teacher training.

The final question posed to each study group provided the springboard for Phase II of the Community College Health Careers Project. That question was: What kinds of formal education, work experience and preparation for teaching will best qualify a coordinator-instructor for this field?

Each study group concluded that individuals must be prepared to take their place on college faculties as full fledged members of the academic fraternity as well as full time instructors in their chosen technical field. However, in many instances those who have gained an adequate background as technicians in the health field, and are therefore prospective instructor candidates, have had only limited contact with the formal academic world. Consequently, a specific question with which each study group had to deal was: What sort of program can be devised that will enable an individual to shift his vocation from paramedical practitioner to college teacher in the paramedical field?

Study committees were only asked to suggest tentative guidelines for teacher education programs, because the actual program provided for teacher training must necessarily be left to the two university centers that will carry out the training programs in cooperation with the project during Phase II. Suggestions from the study groups were pooled and the common elements incorporated in the following proposal for a program to develop a teaching corps for the health technologies:

> Some tentative goals for a program to prepare health technology instructors were identified. The teacher trainees should
>
> 1. become familiar with the underlying philosophy and operating procedures of the two-year college.
> 2. learn to use a variety of instructional techniques; i.e., lecture-discussion, demonstration, independent study, directed clinical practice, etc.
> 3. organize a community college curriculum in his field of health technology using all tools of instruction such as tests and measurements, library resources, audio-visual media, a variety of health agencies for practice and observation, etc.
> 4. bring his knowledge up-to-date in his technical field and add to his depth of understanding in this field.
> 5. supplement, as appropriate, his general background in the physical and biological sciences and the humanities.

Working within an arbitrary framework of a single academic year and with a teacher candidate who has had a minimum of five years of experience as a paramedical practitioner, an experimental program might be devised without regard for course credits, routine tests, and grades. A plan tailored to each trainee's background would depend less on academic routine than on the ability of mature adults to work independently. Grades would not be given for individual courses and students would not be required to amass course credits. A comprehensive examination at the end of the program would measure achievement of the program's objectives without regard to how the goal had been achieved.

The coordinating elements for all students in the program would be a required seminar on the principles and problems of health technology education, and a syllabus outlining the areas to be studied and the fields to be covered. The syllabus would a) describe fields of knowledge to be mastered, b) list required and supplementary reading, and c) make reference to pertinent courses available in various colleges of the university offering the teacher training program. In addition the student would be required to develop an experimental curriculum in his field which could be offered by a two year college. The university professor responsible for the required seminar would serve as personal advisor to each student in the program, or, as appropriate, assign students to other faculty advisors more familiar with the trainees' teaching field.

The teacher education formula proposed would be radical, but it should not be anti-intellectual. A flexible organization does not imply a lowering of academic standards. The lack of concern for credit and conventional academic bookkeeping is not prompted by a desire to escape the rigors of academic accountability, but is rather dictated by a pressing need to accomplish a new and vital educational job in the shortest possible time.

EVALUATION

The final evaluation of the Community College Health Careers Project will be greatly enhanced by continuous evaluation of some of the significant steps being taken during the course of the project. Because each phase of the project is a separate step in curriculum development, each should be examined independently. Evaluation of the entire project must be based on just such a progression of independent evaluations. The results of this on-going evaluation should be helpful for future efforts in this field. For this purpose, a staff member joined the project in December, 1965.

The nature of the Community College Health Careers Project is such that surveys or experiments employing inferential statistics are not feasible. The uniqueness of most of the proposed programs, and the decision to use only one pilot program and one teacher training program in each of the ten areas, precludes the use of experiments using control groups. However, it should be possible to establish a basis for additional research of an empirical nature as similar programs are developed. In light of these limitations several evaluation proposals to review Phases I and II were presented at the second Advisory Committee meeting.

The first of these is a detailed study of the curriculum study groups. Particular emphasis would be placed on objective data such as number of meetings, number of people involved in each area, and the amount of feed-back which took place as members of the groups considered their tasks and proposed solutions. Although each study group was faced with different problems, their general objectives were identical. Therefore, each group's procedures to meet these objectives should be studied.

The second proposal is to establish a procedure for evaluating the teacher-training programs. Since the effort to prepare well qualified teachers is the sine qua non of the Community College Health Careers Project, evaluation of this training year must answer the question, "how effective has it been?" A comparison will be made between what has been taught during the training period with what the beginning teachers actually do on the job. The collection of data about the teacher-trainees' experiences in Phase II will be secured through questionnaires, interviews, and analyses of information about class hours, practical work, course content, textbooks used, etc. Similar procedures will be used to collect information about the new teachers' experiences during Phases III and IV. In addition, extensive data about the trainees' prior experiences both educational and occupational will be gathered to determine how effectively the training year has contributed to their development as efficient teachers. The relation between the evaluation of the teacher-trainees in their year of training and the evaluation of their effectiveness in their first year of teaching will be studied to determine how closely attuned the teacher-training agencies are to the community colleges felt needs in the area of teacher competence.

The third proposal is to conduct a survey of New York State community colleges to obtain facts about their level of interest in, and more importantly their understanding of, the health technologies. The main purpose of the Community College Health Careers Project is to plan and test pilot curricula and to prepare a core of leaders in the health technology field rather than to establish college programs wholesale. Therefore, the insight of the individuals and the number who become acquainted with, and understand, the implications of this field is more meaningful than the number of programs actually started. At the completion of the pilot programs in the community colleges a second survey should be conducted to consider the relative impact the project is making on the state's colleges. These surveys would be useful in evaluating the Community College Health Careers Project's services to the colleges.

NATIONAL CONFERENCE ON EDUCATION FOR HEALTH SERVICE TECHNICIANS

A special appropriation of the present grant was allocated for the convening of a meeting to acquaint key people in the health fields and community college leaders throughout the country with the purpose, structure, function, implications, and initial activities of the Community College Health Careers Project.

A one-day conference was held in St. Louis, Missouri on November 17, 1965. (See Appendix B for the program and a list of participants.)

Two key concerns in health technology education, as seen by the participants in the conference are noted.

A. The emerging occupational roles growing out of changing medical practice and health services are tending to create an unrealistic, overly fragmented series of technical specialties. A watchful eye was counseled to avoid unwarranted occupational splintering and to encourage, to the extent possible, broadly prepared technicians capable of shifting their functions within the health field as the field itself undergoes inevitable shifts in emphases. It was recommended that individuals be broadly prepared for clusters of related technical fields rather than for narrowly-circumscribed specialty areas.

B. Consideration should be given to the need for keeping the door open to the student who later wishes to use his technical education as the basis for further formal education and occupational advancement. It was recognized that efforts to provide for an easy articulation be-

tween technical preparation and professional advancement in the same field are a joint responsibility of the initial technician program and programs educating for the professions. The problem of transfer must become a concomitant consideration as curriculum planning continues. It requires a continuous dialogue between educators concerned with both lower and upper division collegiate education.

Those in attendance seemed to feel that the opportunity to share the thought processes of the C.C.H.C. study groups was valuable with regard to its national implications for developing health service technology programs.

LIAISON AND COOPERATION WITH NATIONAL ORGANIZATIONS, PROFESSIONAL SOCIETIES AND FEDERAL AGENCIES

There exists an extremely complex system of professional associations, organizations representing health service facilities, voluntary health groups, and a variety of federal agencies all concerned with the health field and education for workers in that field. No project that hopes to propose and develop innovations in the health field can hope to reach its objectives without a working relationship with a number of these groups.

It may seem at first glance that maintaining a relationship with the many groups listed below consumes a disproportionate amount of time in relation to the central purpose of the Community College Health Careers Project. However, an occupational education program operating unilaterally without the cooperation and assistance of leaders in the occupational field soon becomes severely handicapped, if not completely frustrated.

The project staff during the period covered by this report:

1. Maintained relationships with federal agencies by
   a. participating in the White House Conference on Health
   b. participating in the Department of Labor-Department of Health Education and Welfare Health Manpower Conference
   c. serving on the Office of Education's National Advisory Committee on Health Occupations Education
   d. serving as a member of the U. S. Public Health Service Project Review Panel for the Nurse Training Act of 1964
   e. serving as consultant to the U. S. Office of Education Bureau of Research

2. Maintained relationships with voluntary health and education associations by serving either as a member or a consultant to:

a. American Association of Junior Colleges - National Health Council Committee on Health Technology Education
b. The Health Careers Committee of the American Hospital Association
c. Several committees of the National League for Nursing
d. The Research and Service Council of the American Association of Junior Colleges
e. The National Council on Medical Technology Education

3. Worked with a variety of educational groups interested in the progress of the project including:
   a. The Audio-Visual Conference on Medical and Allied Sciences
   b. Various state and national associations
   c. Special educational projects at the Massachusetts Institute of Technology, University of California, and the Midwest Technical Center
   d. A Regional Health Resources and Study Committee

In addition to the listing above the membership of the project Coordinating Council and various project working committees provided invaluable interchange with professional associations, health, and educational institutions with which they are affiliated.

A LOOK BACK AND A LOOK FORWARD

Over a period of eighteen months the basis has been laid for an organized assault on the critical shortage of personnel for the health field at a technical level. A system for curriculum planning for health technologies was devised and found workable. Guidelines for preparation of instructors in this field have been developed. Leaders in health, education, and government have been alerted to the potential contribution of the community college in the field of health technology. A blue print has been drawn, but not even the cornerstone has been set in place.

The foundation of education for health technicians, as for all education, is its corps of instructors. The proposal for teacher training which grew out of the activities discussed in this report is radical. It calls for a willingness on the part of many individuals to be inventive, imaginative, and above all adaptable. The vast system of community college (over 700 and growing at an accelerated rate) can make an important contribution to the health of the nation - or the colleges can compound the problem. Sound and careful planning on the part of each college will be important, but the indispensible base must be built on successful pilot programs for teacher training and a rapid spread of these teacher education programs to other regions of the country.

Much is riding on the success of the next phase of the Community College Health Careers Project.

APPENDIX A

Master List of Participants in the Community College Health Careers Project.

Code

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AC	Advisory Committee
X-ray	X-ray Technician
O.R.	Operating Room Technician
Med. Rec.	Medical Record Technician
Inhal. Rx.	Inhalation Therapy Technician
Med. Emerg.	Medical Emergency Technician
Biomed.	Biomedical Engineering Technician
Occup. Rx.	Occupational Therapy Technician
Env. Rad.	Environmental-Radiological Health Technician
Dental	Dental Auxiliary
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APPENDIX B

Program: Conference on Education for Health Service Technicians
St. Louis, Missouri

Agenda

I. Health Service Technicians:

--What are they?
--What is the potential contribution of the two year college in this field?

II. The Community College Health Careers Project:

--Purpose and Organization
--Suggestions for modifying and strengthening project in light of national needs

III. Guidelines for Developing Programs for Health Service Technicians:

--A joint project of the National Health Council and the American Association of Junior Colleges

IV. Available Federal Support for the education of health service technicians

V. The Core Curriculum for Health Service Technicians

VI. Preparation of Teachers

--University pilot plan
--National recruitment

VII. Implications of pilot efforts

--Precautions
--Consultation available
--Expansion plans
--Other approaches

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